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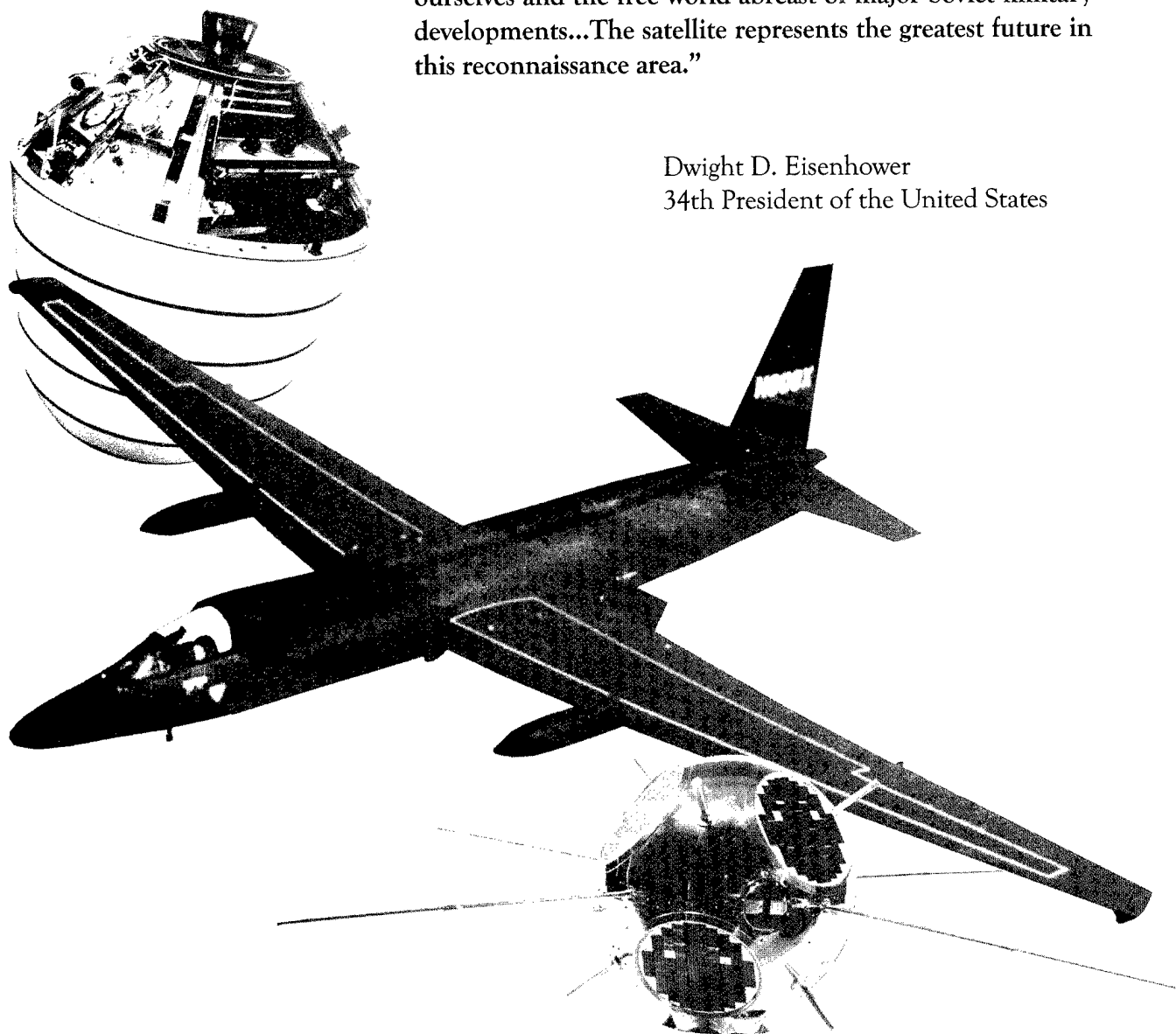
BULLETIN



Winter - Spring 2001
No. 2001-1

"In these times of vast military machines and nuclear-tipped missiles, the ferreting out of this information is indispensable to free world security...Aerial photography has been one of the many methods we have used to keep ourselves and the free world abreast of major Soviet military developments...The satellite represents the greatest future in this reconnaissance area."

Dwight D. Eisenhower
34th President of the United States



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The Center for the Study of National Reconnaissance (CSNR) publishes the *CSNR Bulletin* (ISSN1534-505X) for the education and information of the national reconnaissance community. Employees and alumni of the NRO may submit items for publication.

The CSNR is the policy research and analysis team of the NRO Office of Policy. As its mission, CSNR studies the discipline of national reconnaissance, as well as policy issues associated with openness and declassification issues. Under the direction of the NRO Director of Policy, CSNR makes policy recommendations to the Director of National Reconnaissance.

This information in this newsletter may not necessarily reflect the official views of the Intelligence Community or the Department of Defense.

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CALENDAR OF EVENTS

Event

Date

2001 Pioneer Recognition Ceremony	September 2001
Corona Mobile Exhibit	Available on Request

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EDITOR'S NOTE

Welcome to the first issue of the *Center for the Study of National Reconnaissance (CSNR) Bulletin*. This is an unclassified, periodic publication that contains information about the discipline of national reconnaissance. The main purpose of the *CSNR Bulletin* is to share information about national reconnaissance with current employees of the National Reconnaissance Office (NRO), NRO alumni, and other Intelligence Community and public constituents who are stakeholders in the field. The *Bulletin* is published by the NRO Office of Policy's CSNR.

The NRO, as an organization, was declassified in 1992, and this ushered in a new era of openness for both the agency and the discipline. Since that time, the CORONA and GRAB satellite reconnaissance programs have been declassified, along with a growing body of information about the organization. This has led to even more questions, and sometimes misunderstandings, about what the NRO is doing today and how that relates to what it has done in the past.

Academia, the media, and Freedom of Information Act (FOIA) requestors are seeking an ever-increasing amount of information about the NRO's work—national reconnaissance. Even NRO alumni, most recently during this year's 40th Anniversary celebrations, were asking questions such as, "How can I know what is classified and unclassified today?" and "How can I keep the NRO informed about my activities, address changes, and other information?" The CSNR had plans to develop a publication like the *Bulletin* in the future; but when these kinds of questions were raised during the 40th Anniversary celebrations, we decided that now was the time to initiate this publication.

The *CSNR Bulletin* will be a means by which we will accomplish our goals of education and communication on matters relating to national reconnaissance. The *CSNR Bulletin* will include information about the study of national reconnaissance at the NRO, specifics on what is now unclassified in the field of national reconnaissance, updates on current declassification efforts, data on alumni-related events, and other particulars about the discipline of national reconnaissance. The *CSNR Bulletin* also can serve as a special link with NRO alumni, who may want to stay in touch with today's NRO and national reconnaissance.

This first issue of the *Bulletin* includes thoughts of the NRO Director and the NRO Historian relating to the NRO's 40th Anniversary, an article commemorating this year's Pioneer Recognition Ceremonies, and current activities in the world of national reconnaissance relating to the NRO Commission and NRO declassification.

I welcome feedback and suggestions from all readers. The NRO alumni can use this as an opportunity to provide us with any changes in their status or mailing address. (See the form on the last page of the *Bulletin*.) You can contact us by traditional postal mail, via email at csnr@nro.mil, or by phone on (703) 808-1209. I hope you find this issue of the *Center for the Study of National Reconnaissance Bulletin* useful and interesting, and I look forward to providing you with future insight into the discipline of national reconnaissance and today's NRO.

Robert A. McDonald
Editor

REFLECTIONS ON THE NRO OF YESTERDAY AND TODAY

By Keith Hall

In this, the 40th Anniversary of the National Reconnaissance Office, it is fitting to take a look back on where we have been to better appreciate where we are headed. Though there is still much that cannot be revealed for security reasons, enough information has been declassified to offer some solid insight into this amazing organization. Let me start with a top level view of the NRO's last 40 years. We can divide those decades into three "epics," if you will, the first of which could be called "Pioneering and Perseverance."

Pioneering and Perseverance

The most characteristic feature of this era was uncertainty: uncertainty about what could and could not be done from space; about whether or not the information collected there could be retrieved; about the value of that information in understanding what was going on in the Soviet Union. This was the period of invention that eventually led to the formation of the NRO. The model it hoped to follow was the U-2 spy plane, which was a joint Air Force/Central Intelligence Agency (CIA) project. The U-2 program was conducted in great secrecy, with ample funding. It was given a clear mission, then pretty much left to the program managers to implement. The result was a wildly successful platform, which was completed in record time and under budget. President Eisenhower and members of the defense community hoped to apply that method to the challenge of building satellite systems.

The need for such systems originated in Eisenhower's conviction that, sooner or later, one of those U-2s would be shot down, cutting us off from the information produced by those overflights of the Soviet Union. As it turned out, Eisenhower's conviction was prophetic because in May of 1960, Francis Gary Powers' U-2 was shot down over the



*Corona Image: Soviet Solid Rocket Motor
Production Plant Near Biysk, USSR*

Union of Soviet Socialist Republics (USSR), creating a huge international incident and effectively ending forever our ability to fly spy planes over our number one threat. Fortunately, just a few months later, because of the work already underway, two satellites—GRAB and CORONA—were placed into orbit. GRAB was a Signals Intelligence satellite designed to intercept radar signals from deep inside the Soviet Union. CORONA was the first photoreconnaissance satellite. Together, they effectively provided the nation with the information we needed to manage our relations with the Soviets and to understand the threat they posed.

In this early period, the big question was, "Is there a missile gap?" After several successful CORONA missions, the conclusion reached was, "Yes there is a missile gap, but it is in America's favor, not the Soviet Union's." Also during this period was the Cuban Missile Crisis. CORONA satellites, supplemented by U-2 overflights of those islands, provided the timely, reliable, and accurate information President Kennedy needed to manage that crisis. Those were the early days during which the Founders and Pioneers of National Reconnaissance developed and delivered these marvelous systems.

Live, Via Satellite

From their successes sprouted new objectives: faster information retrieval from the satellite and greater information quality. These challenges drove the second of the three epics—"Live Via Satellite." It spanned the years between 1970 and the end of the Cold War and was a period of great invention. The question central to this period was, "Can we use this to support current operations?" No longer was the concern limited to counts of missile silos inside the Soviet Union. We were now starting to look into ways to provide support to military forces engaged in operations. Each of the military services formed offices called TENCAP—Tactical Exploitation of National Capabilities—to explore methods by which they could take information from satellites and provide it to those military forces actually doing the "heavy lifting." By the time the Gulf War began, there was a wide variety of information and products available to support our armed forces, as well as whole new varieties of information. As a matter of fact, all of the systems that were invented and flown in this era remain classified to this day, as do most of the older systems.

A New Operating Environment

With the end of the Cold War we entered the third epic, in which we find ourselves today. It might best be titled, "A New Operating Environment" and its central feature is the reliance of our military on these systems, though their traditional role in the national decision-making process remains as important as ever. During this period, the NRO came out into the open, acknowledged its existence, and opened up opportunities to interact with a much larger group of potential customers. If you look at these three factors things are very different from the early days.

In the beginning, security was absolutely imperative. President Eisenhower simply did not know how nations were going to react to the fact that the U.S. was spying on them from space. So the old approach was, "the less said about it the better." Also—and this next point applies today—if our adversaries understood how we were acquiring information they could take measures to deny it to us—they could cover it up, camouflage it and so forth. So security was very tight in those early years.

Another dramatic difference between then and today is in the timeliness of our product. Our initial

photoreconnaissance satellites had film on board the spacecraft, which would spool as it took the pictures. Then after a week or two, or maybe a month, the film canister would be returned to earth. The result was that the photographs were not very timely. They may have been anywhere from a week to a month old before the analyst even got to them. Because of that lack of timeliness, in addition to the secrecy surrounding the work, the customers were basically those at the very top of the government: the top military officials; the head of the Strategic Air Command and various members of his staff; the Central Intelligence Agency; the President; and a very small group of people in the know.



DNRO Keith R. Hall

Obviously, the most significant change between then and now is the fact that the NRO is now public. We still have people from the old days who feel a little twitch when they drive by our entrance and see the big National Reconnaissance Office sign out there, because for 32 years of our existence you couldn't use the term, "National Reconnaissance Office" except in a secure facility. Now we're out in the open for much of the things we do: taking pictures from space; signals intelligence collection from space; and the fact that we launch our satellites on specific rockets from Vandenberg Air Force Base and Cape Canaveral. Even the NRO's organizational structure is open.

Our information now is very timely. Again, I can't go into details but I can tell you that during Operation Allied Force in Kosovo, important information collected from satellites would reach commanders and military personnel

in the field—frequently in cockpits—in a matter of minutes from the moment of data collection over the target. This current timeliness largely explains the tremendous reliance that the military now has on these systems. And, of course, the fact that we're now out in the open allows the NRO to interact with many more different customers beyond those in Washington. Besides the military (all the way down to the tactical level), our other significant customers include federal agencies involved in disaster relief for whom the satellite information we provide helps determine where the most significant damage has occurred. So there is a wide variety of customers today for NRO.

We have also made some very significant organizational changes. In the early days, the NRO was divided into four program offices imaginatively named Program A, B, C, and D. Program composition depended upon which organization its people belonged to. For example, Program A was Air Force (they were located primarily in Los Angeles); Program B was run by the CIA; Program C was largely Navy; and Program D was a joint Air Force/CIA program responsible for the early development of the SR-71 OXCART program. Program D was transferred out of the NRO in 1974 and turned over entirely to the Air Force, leaving us with Programs A, B, and C. That was the regime until 1992 when the decision was made to bring everybody together here in Northern Virginia, to abolish these individual programs, which were based upon personnel affiliation, and to organize by the type of work being done.

So today we are divided into directorates, each of which might include people from many different organizations. For example, all those individuals working on imagery or photographic reconnaissance would be under one directorate, while those working on signals intelligence, communications, research and development, or launch, would be in others. That new organizational structure occasioned the construction of our current headquarters building, which opened in 1996. We still have some of the culture from those old organizations—and its associated competitive spirit—that continues to affect our work today.

The Challenges of Openness

I have spoken about both the opportunities and the challenges of becoming an open organization. Perhaps the most important aspect is the ability to support more people with the data that flows from these systems. There has been a significant investment in the systems that the NRO

flies, and I think this is good for the country. Now, more people can benefit from these assets across the various federal agencies. You no longer must have a special access to see the information that comes from these satellites or to even know that they exist.

With this has come a lot more oversight. Insofar as this new oversight is one of the consequences of our having won the Cold War, we welcome it. That there would be difficult challenges associated with that new oversight stands to reason. After all, this organization was designed to function in a hidden world. Expecting it effortlessly and immediately to undergo such an immense paradigm shift is like expecting your car to ford a river simply because you've run out of road. It is possible for it to perform in that way, but not before you have performed some expensive and time-consuming modifications. The NRO of today must contend with oversight, and I think we're doing so successfully.

We also have a much more open budget process, which can be of concern. There are more and more people involved in the budget process who are allowed to look at what the NRO is doing. Our systems are often risky and expensive, and sometimes controversial, and there never seems to be a good time to take on a risk or spend a lot of money. The result is that it is much harder to get major new initiatives through the budget process these days. But again, we are contending with that.

Relevant Then, Relevant Now

Let me just reemphasize the importance of these systems to our national security. During the Cold War, the NRO was the brand name within the intelligence business. There were other brand names too, but the NRO was the foremost means of understanding what was going on deep inside the Soviet Union. Some have said, "Well now that the Soviet Union no longer threatens us what is the importance of these space systems? After all, they are risky, expensive, and often controversial." Those attributes of space systems applied then and they apply to this day. Nonetheless, these systems, then as now, continue to be important aspects of our national power.

We are the only nation on Earth that has these capabilities to this standard of quality. These systems offer our military personnel around the world a great advantage as they go about their duties. They supply our Intelligence Community partners from the Defense Intelligence Agency, National Security Agency, Central Intelligence Agency,

National Imagery and Mapping Agency, and so forth with the information they need to understand what is really going on. What we provide is unique information. These are the attributes that will forever surround our space systems. They have no equal, and I can guarantee that the NRO's importance to national security will remain high in the future.

So, for over 40 years, that is our track record. I think it is in the neighborhood of 300 satellites that the NRO has flown. They have collected millions of pictures and an untold number of signals, and the data continues to arrive in greater quantities everyday.

If you look at the NRO of tomorrow, you will note that the missions of the 21st century are ones we have always performed: indications and warnings; providing our national command authority with advance notice of potential problems; acquiring communications intelligence about our adversaries; international monitoring of military forces; and of course, monitoring arms control agreements. We also have a number of new challenges that represent very difficult intelligence problems. These are the problems that the NRO now faces, the solutions for which the pioneers of tomorrow are grappling: countering terrorism; finding mobile missiles before they can harm our forces; and, of course, weapons of mass destruction that are so difficult to detect and monitor.

Finally, our new openness has given rise to some evolving missions in support of our new customers: countering illegal drugs; environmental monitoring; and, as I said before, disaster relief operations. The NRO of today is built on the legacy of our Founders and our Pioneers: their vision, their efforts, and their selflessness. I believe that if we can hold true to their legacy, we will step up to those challenges and help assure the nation's security in the years ahead.

Keith Hall is the outgoing Director of the NRO and Assistant Secretary of the Air Force (Space). He became the DNRO in March 1997. As the DNRO, he has been responsible for the overall supervision of space matters in the Air Force, and for the acquisition and operation of all U.S. space-based reconnaissance and intelligence systems. He has worked in intelligence since 1970.

THE ORIGIN OF THE NATIONAL RECONNAISSANCE OFFICE*

By Cargill Hall

Forty years ago U.S. leaders created a hybrid National Reconnaissance Office (NRO) to meet the unusual intelligence demands of the nuclear age and the Cold War. In so doing, they bound together for the first time in one organization all the major elements of the Intelligence Community, the military services, and numerous industrial firms in what would become a continuing partnership. The chain of events began when President Dwight D. Eisenhower and a few confidants undertook national and international initiatives between 1953 and 1961 intended to reduce military uncertainty and help preclude a surprise nuclear attack. Among them, they approved for development remarkable overhead technical systems that could collect reliable intelligence about the military equipment and disposition of Soviet strategic forces; in the process they opened the Soviet Union to American scrutiny.



President Dwight D. Eisenhower

*Adapted from the monograph, "NRO at Forty: Ensuring Global Information Supremacy," R. Cargill Hall

Eisenhower's strategic intelligence collection systems included high altitude balloons (Project GENETRIX), airplanes (Projects AQUATONE U-2 and OXCART A-12/SR-71), and, moving above airspace into outer space, reconnaissance satellites. The U.S. Air Force had begun the latter effort independently and by 1956 had contracted with industry for its reconnaissance satellite program, first known as Weapon System (WS)-117L. After the launch of the Soviet Sputnik I in October 1957, the classified WS-117L program (later renamed SAMOS) was widely and accurately reported by the media to be a reconnaissance vehicle. This distressed Eisenhower, who insisted on absolute secrecy in matters of intelligence. In early 1958 he ordered the film recovery element removed from SAMOS (an element that appeared most promising for rapid development) and named a CIA-Air Force team to manage it—a team similar to the one that had managed the U-2. With that action he established an unacknowledged, classified reconnaissance satellite program to become known publicly as the DISCOVERER biomedical research project, and, to those witting of its true purpose, as CORONA.

A year later in 1959, Eisenhower approved a second unacknowledged reconnaissance satellite program, eventually known as GRAB (Galactic Radiation and Background) experiment, designed to collect electronic intelligence (ELINT) from Soviet air defense radar. This reconnaissance satellite mounted two payloads: one of them, announced publicly, measured Solar Radiation (SolRad) and served as a cover for the second, unannounced and highly classified ELINT package. Launched on 22 June 1960, GRAB operated on orbit for a number of months and thus has the distinction of being the country's first successful reconnaissance satellite. The Naval Research Laboratory managed GRAB for the Director of Naval Intelligence and the National Security Agency (NSA).

Finally, in late August 1960, after the loss of a U-2 airplane inside the USSR provoked an international furor, Eisenhower removed the SAMOS program from Air Force military control and placed custody of it in a civilian-directed office in the Department of the Air Force—an office that reported directly to the Secretary of Defense.

The man selected to head the new Pentagon office and the Air Force reconnaissance satellite program was Air Force Undersecretary Joseph V. Charyk. When in January 1961 John F. Kennedy succeeded Eisenhower as President, a newly appointed Secretary of Defense, Robert S. McNamara, asked Charyk to remain as director of the Defense Department's satellite reconnaissance office. On 6 September, McNamara formally established the



Joseph V. Charyk, Undersecretary of the Air Force and first Director of the National Reconnaissance Office, 1961-1963

National Reconnaissance Program (NRP) that would consist of "all satellite and overflight reconnaissance projects whether overt or covert," and he converted the civilian Air Force office into the National Reconnaissance Office to manage that program.

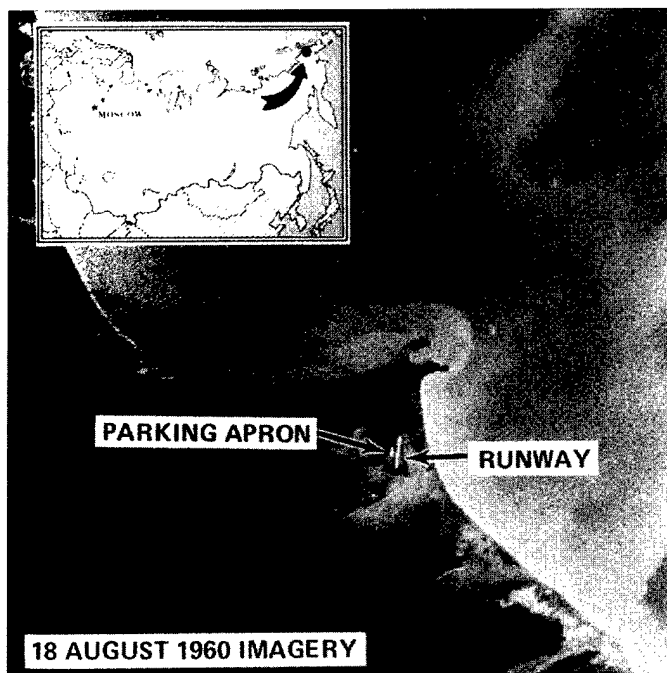


SECDEF Robert McNamara established the National Reconnaissance Program (NRP) and the National Reconnaissance Office to manage it

The DoD directive that established the NRO also made it a classified organization whose existence was known only to those directly involved. (For many years even the name

of the office was classified Secret within compartmented channels.) In an accompanying agreement between CIA and DOD, Joseph V. Charyk (Undersecretary of the Air Force) and Richard M. Bissell, Jr. (Deputy Director of Plans, CIA) were named as the NRO's joint directors. Together they had full authority to execute the effort. In the charter and interagency agreement, control of the CIA-managed CORONA film recovery satellite program also transferred to the NRO, now to be funded through the NRP budget, much to the dismay of some CIA leaders, while the Navy's GRAB satellite program required another agreement before it, too, moved to the NRO and NRP funding in May 1962.

In succeeding years the NRO and its contractor-team designed, built, launched and operated various high-priority reconnaissance satellites. Together, the NRO's confederated Satellite Programs, A (Air Force), B (CIA), C (Navy), and its aerial systems comprising Program D (transferred to the USAF in 1974) revolutionized strategic intelligence collection, made possible verifiable arms control treaties, and set the Cold War firmly on course to its denouement in 1989-1991. In fact, the first images of the Soviet Union returned by CORONA satellites in August and December 1960 all but eliminated the prevailing supposition that a "missile gap" favored the USSR—an assessment publicly acknowledged to be erroneous by Secretary of Defense Robert McNamara in early February 1961.



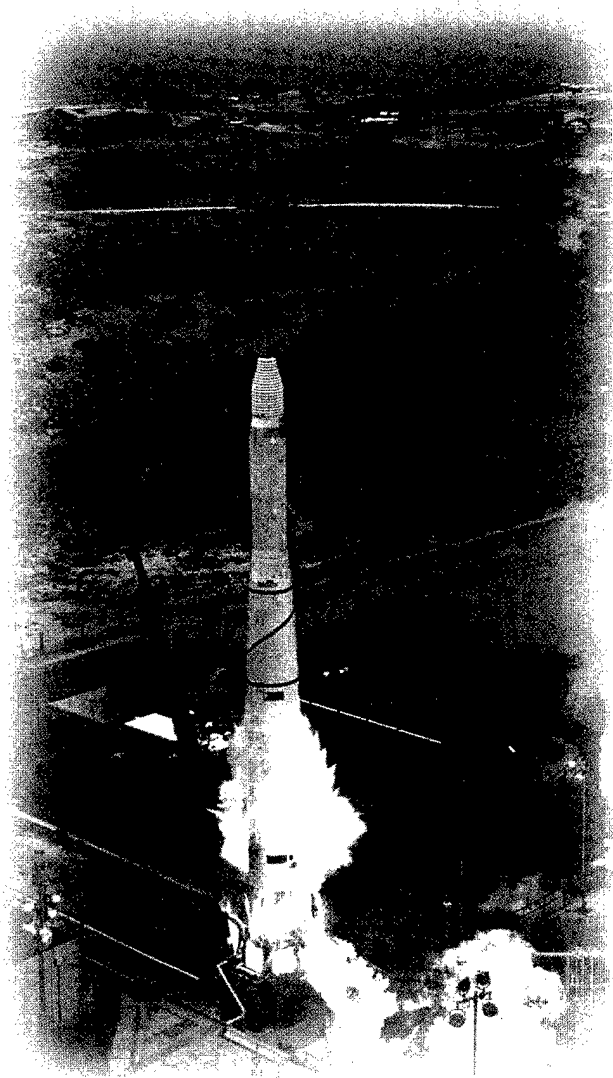
Mys Shmidt Air Field: First Image of an Intelligence Target taken by CORONA 14 (Mission 9009), on 14 August 1960

Beginning in 1962, an NRP-funded low altitude

weather satellite (the first operational system of its kind) orbited the Eurasian landmass in front of imaging satellites. It transmitted vital meteorological information, and made possible cloud-free photography over areas of interest.

Innovations such as this continued to contribute to NRO successes throughout the Cold War. The NRO has continually fulfilled its mission to ensure global information supremacy for the United States. In that endeavor, we now remember the origin of an intelligence enterprise with a heritage second-to-none—whose lineage can be traced to a small civilian-directed office established in the Department of Defense forty years ago, on 31 August 1960.

Cargill Hall was named the NRO Historian in March 1998. He previously served as the Manager of the Contract Histories Program in the Air Force History Support Office. His career as a historian spans over 40 years and includes over 40 publications.



PIONEER 2000 - RECOGNIZING PERSONAL CONTRIBUTIONS

By Tom Nath, Kathryn Sieh, &
Cherie Jones

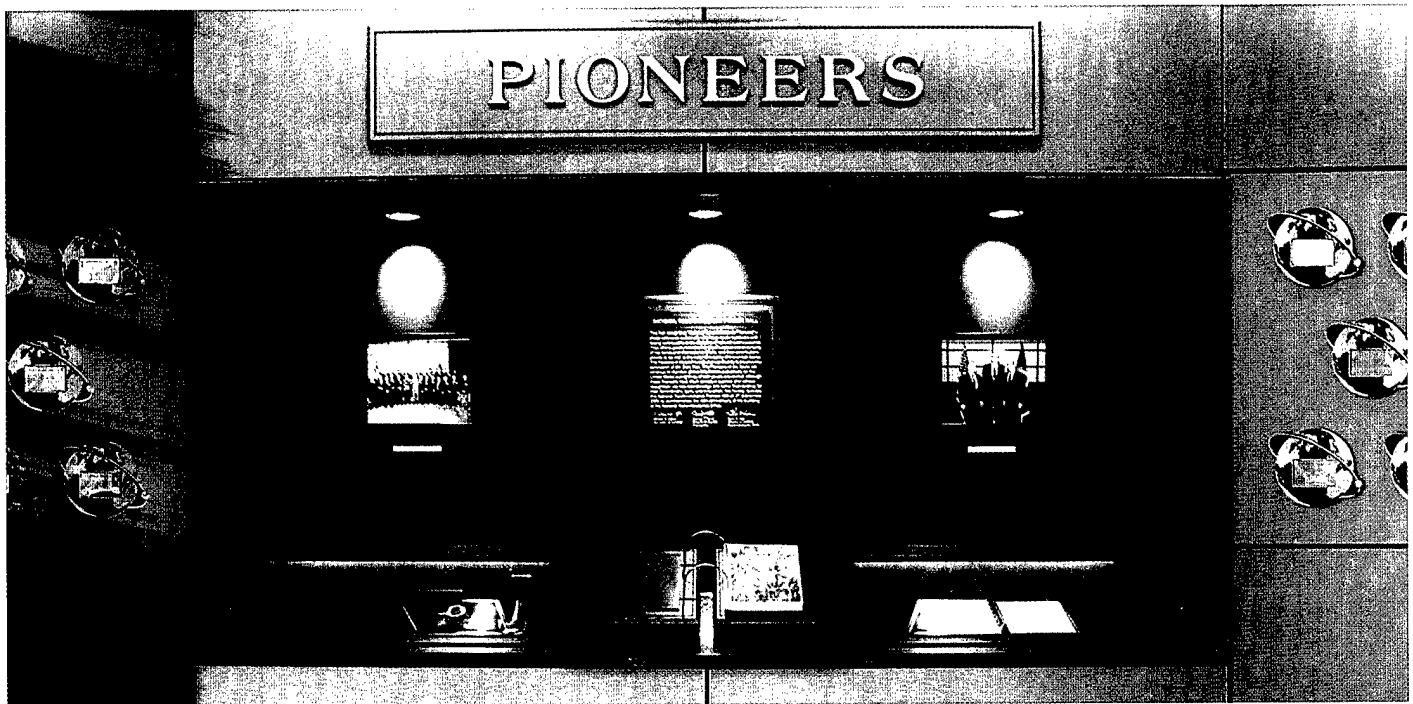
The National Reconnaissance Pioneer Recognition Program

Director of Central Intelligence George Tenet and Director of the National Reconnaissance Office (NRO) Keith Hall honored 56 individuals at NRO Headquarters in September 2000 during the NRO's 40th Anniversary celebrations. The Pioneer Recognition event represented the first annual induction ceremony of the National Reconnaissance Pioneer Recognition Program. The group of honorees was composed of 46 National

Reconnaissance Pioneers and 10 additional Founders of National Reconnaissance. Mr. Hall inaugurated the Pioneer program to recognize and honor the individuals who have made significant and lasting contributions to the discipline of national reconnaissance.

The Pioneers are the government, contractor, and university personnel who, shortly after World War II, began creating what has become a dynamic U.S. national reconnaissance capability. Not only did they define the concept of peacetime strategic reconnaissance, but they also revolutionized overhead technical collection systems that extended into space. As described by NRO Historian, Cargill Hall, they collaborated closely to "... build, launch, and operate in space some of the most remarkable machines ever known." For decades, these individuals worked in secrecy, without fanfare or acknowledgment, but now they are recognized. Each year, the DNRO will select one or more National Reconnaissance Pioneers from among those who contributed most significantly to these achievements. Each Pioneer is inducted by the DNRO into Pioneer Hall, where a medallion describes the Pioneer's contributions to national reconnaissance.

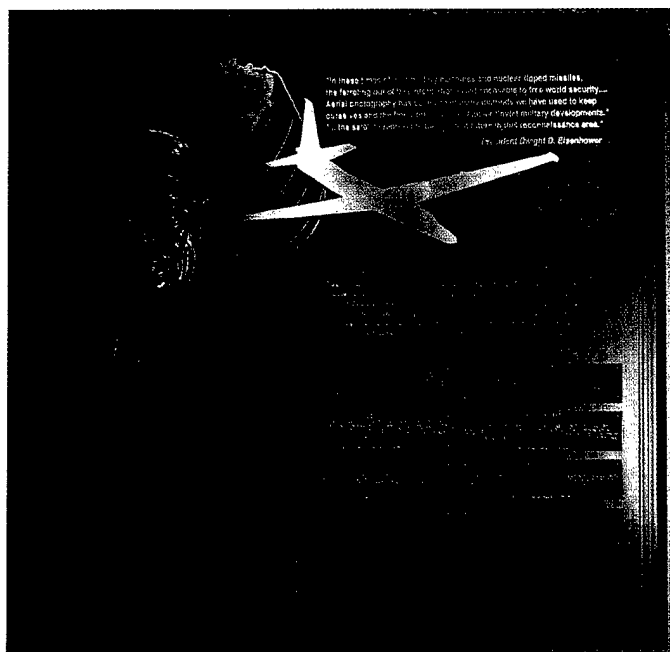
The Founders of National Reconnaissance were also recognized in September 2000. The Pioneer Selection Board, when it submitted its recommended Pioneers, made an additional recommendation to designate these 10 individuals as Founders of National Reconnaissance. This one-time group of honorees served as advisors on



Pioneer Hall at NRO Headquarters, Chantilly, VA

intelligence collection, providing counsel to President Dwight D. Eisenhower and his successors that assured the success of the national peacetime strategic reconnaissance policy. As scientists, engineers, and innovators, these individuals also provided the confidence for founding the National Reconnaissance Office in 1960-61, and the technical expertise that shaped the emerging discipline of national reconnaissance and, ultimately, the course of the Cold War.

The achievements and contributions of these 56 Pioneers and Founders to their field embrace the history of the discipline and practice of national reconnaissance. This history can be organized into three periods: the early years, the years leading up to the NRO's founding, and



40th Anniversary Commemorative Plaque at NRO
Headquarters, Chantilly, VA

the NRO era. The contributions of the Pioneers and Founders described below define each era and their innovations and successes, and demonstrate the importance of these individuals in the history of national reconnaissance.

The Early Years: National Reconnaissance Emerges as a Discipline (1945-1955)

In the ten years following World War II, Air Force studies, Presidential initiative, and remarkable scientific innovation brought national strategic reconnaissance from a concept to a national policy. Starting with aerial and balloon overflights, and eventually evolving to satellite

and space-based reconnaissance, the nation's ability to gather reliable global intelligence based on the strategy of peacetime reconnaissance was decisively established. The country's acquisition of these new capacities was due largely to the contributions of the Pioneers and Founders, who developed the theories behind aerial and satellite reconnaissance, and then designed, operated, and managed the vehicles that accomplished these missions.

In 1946, Pioneer Colonel Richard Leghorn first proposed the concept of peacetime strategic reconnaissance in an effort to prevent a surprise attack. Thus the strategic purpose of national reconnaissance was born. President Truman and especially President Eisenhower were very interested in this subject and set up panels and committees to study its potential. Founders Dr. William Baker, Mr. Merton Davies, Dr. Richard Garwin, Dr. James Killian, Dr. Edwin Land, Mr. Frank Lehan, Dr. William Perry, and Dr. Edward M. Purcell worked on and headed various committees to study the issue and suggest solutions to questions that arose. These groups framed the structure in which private industry, the military, central intelligence, and academia worked together to form the National Reconnaissance Program (NRP).

The early success of military and CIA aerial reconnaissance programs, due mainly to the efforts of several Pioneers and Founders, ultimately allowed the evolution from earth-based to space-based reconnaissance. Major General Osmond Ritland served as the Air Force manager of the U-2 Program, and ensured the service infrastructure and pilots that made possible U-2 overflights of the USSR. Mr. Charles Spoelhof collaborated on the design of the U-2, A-12, and SAMOS cameras, and later directed the application of thin-based Mylar film in NRO camera systems. Dr. James Baker designed almost all of the lenses and most of the cameras used in aerial reconnaissance, and more importantly helped win President Eisenhower's approval for the U-2. Mr. Walter Levinson designed the duplex camera for GENETRIX reconnaissance balloon program, and a panoramic camera adapted for the CORONA satellite that helped to lead the NRO into the space age. Founder Mr. Amrom Katz proposed and helped design film recovery satellites, and later conducted the first experiments on electro-optical imaging satellites. Mr. John Parangosky provided the necessary managerial skills that enabled the U-2 and CORONA programs to be successful, leaving a lasting impression on the operations of the NRP.

Mr. Howard Lorenzen and Mr. Reid Mayo worked together on the GRAB program, the nation's earliest successful reconnaissance satellite program and the first electronic

or signals intelligence satellite. At the Naval Research Laboratory, Mr. Mayo conceived and designed the system, while Mr. Lorenzen directed its development. These two Pioneers led the establishment of a whole new direction and field of national reconnaissance, which has proven to be invaluable over the past four decades.

The Space Age Meets National Reconnaissance (1956-1960)

During the years immediately leading up to the founding of the NRO, the Pioneers and Founders helped create the nation's first imaging satellites and develop the U.S. signals intelligence collection capability. The successes of these years established the precedents and the foundation for the achievements of future reconnaissance systems following the creation of the NRO.

On the imagery intelligence side, this era saw remarkable innovations in both the technology, and the management and operations of U.S. reconnaissance systems. Colonel Frederic Oder directed the nation's first reconnaissance satellite enterprise, the USAF WS-117L (later SAMOS) Program. A part of that program was later separated, and became CORONA, which was directed by Colonel Lee Battle. Colonel Battle led the combined government-contractor team that produced, launched, and operated the first CORONA satellites. Colonel Charles Murphy was the first technical director of the CORONA Advanced Projects Integration Facility. Mr. Francis Madden directed the testing and production of the CORONA cameras. Mr. Mark Morton directed the team that developed CORONA's reentry capsules, as well as those of subsequent programs. Mr. Roy Burks served as the CORONA Technical Director, successfully integrating government, military, and contractor development teams. The management and scientific innovation of these Pioneers resulted in the unparalleled success of the CORONA program.

The signals intelligence program also experienced rapid improvement during these years. Colonel John Copley helped design and develop Program A SIGINT satellites from the early experiments through the introduction of high altitude constellations. Mr. Peter Wilhelm improved the performance of low altitude SIGINT satellites with his new techniques and devices. The innovations of Mr. James de Broekert included wideband distributed amplifiers and pulse signal processors as well as the first geo-location of emitters from a spinning platform. Mr. Donald Tang's collection scale aided not only Program A in determining which signals could be collected at a reasonable cost, but also all subsequent programs. These innovations set the stage for the development of all future SIGINT systems.

Other improvements in satellite capabilities during this era were invaluable to the overall success of the systems' operations. Pioneer Mr. Robert Powell devised a novel attitude pointing mechanism that extended the lifetimes of all satellites in orbit. Mr. Robert Crotser was the contractor business manager for Program B, and wrote a cost and schedule management handbook that is still in use today. Mr. Cornelius Chambers introduced a procedure for autonomous reconfiguration and "safe mode" operation, which became the bedrock for flight control after 1975. Founder Dr. Sidney Drell served as both an intelligence advisor and a scientific advisor, and played a key role in obtaining approval for several special NRO projects.

The NRO Years (1960 and Beyond)

The Pioneers and Founders who have worked on national reconnaissance assets since the creation of the NRO have built upon the achievements of their predecessors and revolutionized the U.S. reconnaissance capabilities in all areas of intelligence gathering.

Following the success of the CORONA program, the nation's imagery intelligence satellite systems experienced a rapid period of innovation and improvement. Several Pioneers contributed through their managerial skills, enabling the day-to-day operations to run smoothly. Dr. Albert Wheelon, the first director of the CIA's Directorate of Science and Technology, led the development of OXCART (A-12/SR-71) and three reconnaissance satellite systems, and was responsible for U-2 overflights. Dr. Julius Peline and Colonel Frank Buzard were the program managers for follow-on high-resolution satellite programs, with Colonel Buzard guiding a record number of consecutive successes. Colonel Thomas Haig led of a team that developed the NRO polar-orbiting meteorological satellite that greatly improved the efficiency of the early imaging satellites through its accurate and timely cloud cover forecasts.

The scientific innovations achieved by Pioneers since 1961 resulted in a continuous revolution in imagery intelligence collection. Mr. Robert Kohler, who worked in Program B, developed improvements in imaging and photographic techniques. Mr. Edward Reese led the development of the ground data handling system to process imagery from electro-optical imaging satellites. Mr. Ellis Lapin directed system design and engineering for early Program A satellites, one of which almost doubled the vehicle's longevity. Another member of Program A, Colonel Lee Roberts, directed improvements that resulted in high resolution images at the Earth's surface, and another that advocated the use of NRO satellite imagery by other agencies at great savings to the government.

Colonel James Mannen introduced procedures that improved target tasking, ground resolution, and on-orbit system reliability.

The revolution in the nation's satellite collection capacity also embraced the signals intelligence program. The management of these systems involved several Pioneers. Dr. Lloyd Lauderdale, while director of the NRO's Program B, greatly improved overhead signals collection. Colonel John Browning was the director within Program A that managed the first launch of a key SIGINT satellite that markedly improved signals intelligence collection. Colonel Jon Bryson directed the development, acquisition, and operation of a Program A SIGINT system that handled rapidly increasing data rates. Colonel Robert Yundt directed the Signals Intelligence Project Office in Program A, and developed a low altitude multi-purpose SIGINT satellite that utilized the Agena upper stage and became vital to the

NRO's early efforts in electronic intelligence collection. The advancement of these systems' signals collection capabilities is also due to numerous innovations by various Pioneers. Mr. James Morgan was an early advocate of using electronic intelligence satellite for technical support of the military during combat operations, and he introduced several improvements for tasking and data dissemination. Mr. John Bennett, as the chief engineer for the NRO contractors in Program B, made design improvements that greatly improved overhead SIGINT reconnaissance. Mr. Forrest Stieg, also in Program B, introduced a process that saved the NRO a great deal of money by balancing the need for signals collection with vehicle longevity. Dr. Marvin Stone introduced algorithms that improved data processing ten-fold. Colonel Gary Geyer's career spanned both government and industry work with SIGINT and overhead imaging, and his work allowed information to reach customers in near real time. Mr. Alden Munson, Jr. was



The Year 2000 National Reconnaissance Pioneers and the Founders of National Reconnaissance, with DCI Tenet (right) and DNRO Hall (left).

Front Row, left to right: Founders M. Davies, R. Garwin, S. Drell.

2nd Row, left to right: DNRO K. Hall, Pioneers F. Stieg, J. Bryson, M. Morton, J. Bennett, R. Powell, F. Oder, P. Mayhew, C. Spoehlof, D. Tang, C. Chambers, R. Crotser, G. Geyer, R. Mayo, R. Burks, R. Kohler, DCI G. Tenet.

3rd Row, left to right: Pioneers C. Murphy, J. de Broekert, F. Buzard, F. Madden, R. Roy, J. Mannen, E. Reese, T. Haig, J. Copley, M. Stone, F. Kaufman, E. Lapin, A. Wheelon, A. Munson, P. Wilhelm.

Not Pictured: Founders W. Baker, A. Katz, J. Killian, E. Land, F. Lehan, W. Perry, E. Purcell; and Pioneers J. Baker, C. Battle, J. Browning, J. Crowley, L. Lauderdale, R. Leghorn, W. Levison, H. Lorenzen, J. Morgan, J. Parangosky, J. Peline, O. Ritland, L. Roberts, C. Roth, R. Worthington, R. Yundt

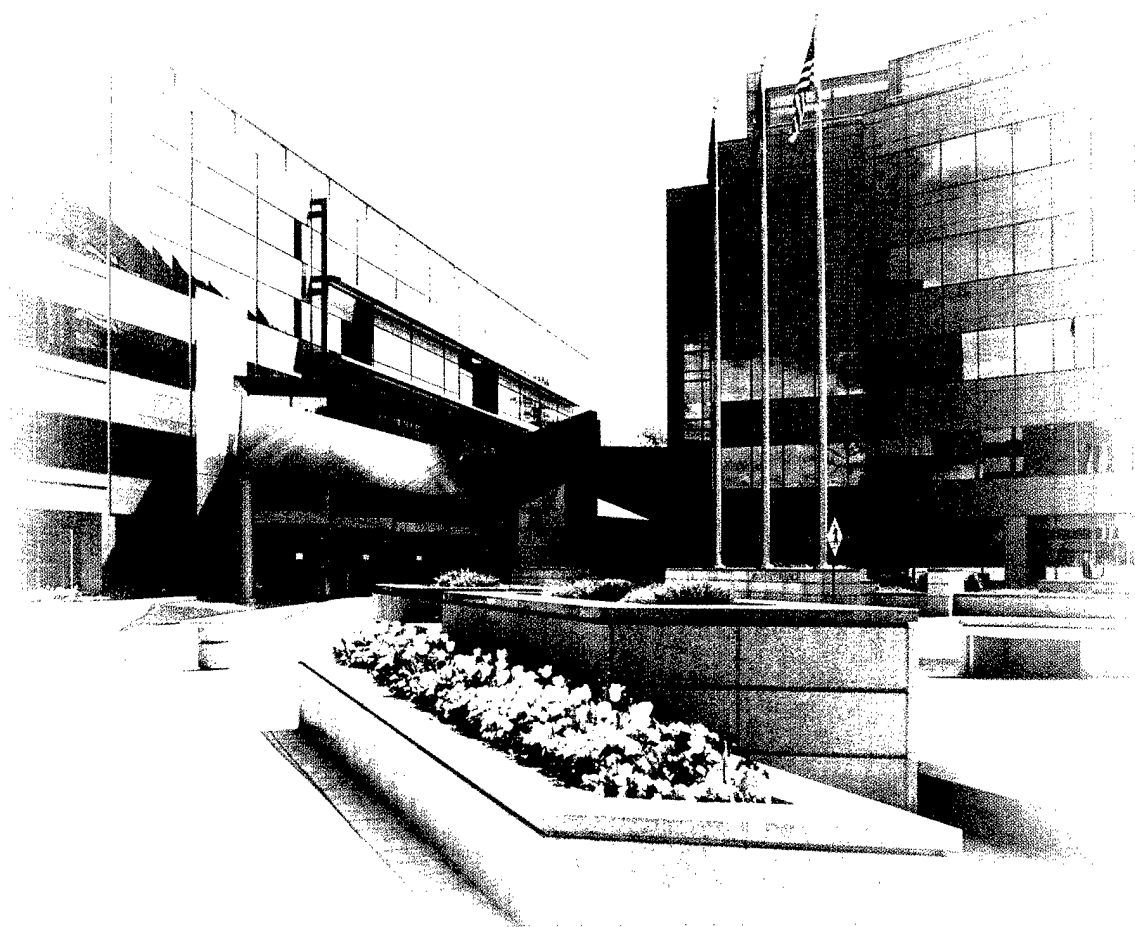
vital in obtaining the military's acknowledgement of the usefulness of the NRO, and introduced and developed a fully automatic operational electronic intelligence collection and data processing system that directly supported U.S. military forces in the field. *Dr. Paul Mayhew* served as a project manager and system engineer for two unprecedented SIGINT systems. *Mr. Frederick Kaufman* directed two SIGINT satellites in Program B and innovated the liquid-propellant apogee injection engine, which enabled a conventional launch vehicle to place a heavy payload into a high orbit.

Pioneer managers and innovators also achieved successes in other aspects of reconnaissance satellite development and operations. *Colonel Roy Worthington*, as the Deputy Commander of the 6594th Aerospace Test Wing, launched and integrated 200 satellites. *Mr. John Crowley* (CIA), as Chief of Program B's Office of Special Projects, was vital to constructing a good relationship between the CIA and the Defense Department elements at

the NRO, in addition to directing two innovative satellite systems. *Colonel Robert Roy*, as the Director of NRO launch operations at Vandenberg AFB, established NRO safety requirements as well as procedures for ground safety and launch preparation that became the standard for NRO launches.

The Pioneers and Founders honored in the year 2000 are only a few of the many individuals whose services have been vital to the discipline of national reconnaissance and 40 years of NRO successes. Regardless of when their contribution was made, they influenced the performance of NRO overhead systems. The Pioneer Program will continue to identify and recognize those individuals who made significant advances in the field of national reconnaissance, ensuring for our nation's leaders information supremacy in the 21st century.

Tom Nath, Kathryn Sieh, and Cherie Jones are research and policy analysts in the NRO Office of Policy's Center for the Study of National Reconnaissance.



THE WORLD OF A DECLASSIFIED NRO

By Randy Cohen

Introduction: Declassification Considerations

The decision to declassify Reconnaissance NRO information involves maintaining a delicate balance between the ability to collect meaningful intelligence and the public's right to know how well the NRO is performing its mission. One major consideration in deciding whether to declassify information is the expected impact on future collection that the released information will have. Each element of information that is released adds to the growing volume of information about how the NRO functions, how NRO systems operate, and which weaknesses and vulnerabilities may be exploited to decrease or neutralize the effectiveness of NRO systems.

It is often difficult, if not impossible, to link the release of a single declassified element of information, or even a series of elements of information over time, with a specific decrease in collection capability or a reaction from the targeted countries. Long-term studies, however, demonstrate that the more an adversary knows about the U.S. intelligence capability, the better able that adversary is to deny the U.S. the critical information needed by policymakers and strategic planners. National-level policymakers who rely on the intelligence supplied by NRO systems must not harbor any doubts about the authenticity of the intelligence provided or the reliability of those systems to provide information, otherwise they will not want to depend on them for fear they will not be available during a crisis. This is why so much care is taken in deciding what can be declassified.

Overview of the Declassification Process

That said, documents can become declassified through a number of mechanisms. There are four ways by which information can be declassified. Three are provisions

under Executive Order 12958: Automatic Declassification, Systematic Declassification, and Mandatory Declassification. The fourth is through a FOIA request. Regardless of the process by which NRO information is declassified, the declassification review involves a thorough assessment to examine the risks particular to releasing that information. This evaluation covers such factors as the risk that releasing the information will negatively impact current collection capabilities, the risk that release of the declassified information will reveal to foreign countries how to collect intelligence against the United States, the risk of exposure of sensitive technology, and the risk that a vulnerability of our collection capability will be exposed. The decisions about what information can and should be released are based on this appraisal.

Automatic Declassification Review

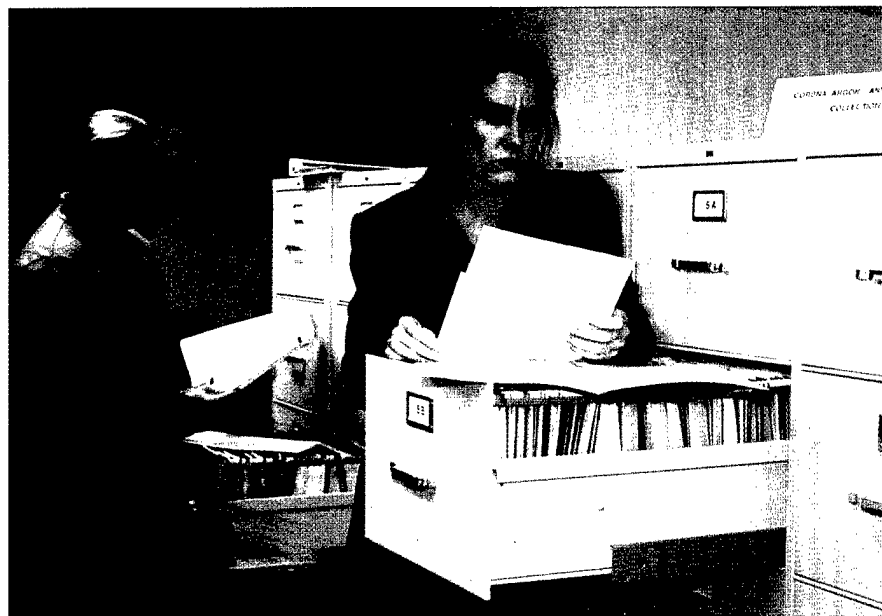
The automatic declassification provision of EO 12958 stipulates that all records 25 years old or older automatically become declassified unless reviewed and exempted prior to the Order's deadline, which for the NRO is October 2002. The NRO has reviewed over one million pages of classified records as part of its automatic declassification review, and has released approximately 38,000 pages to its Reading Room at NRO Headquarters.

Systematic Declassification Review

Systematic declassification, unlike the mandatory and FOIA methods, is proactive, meaning that the process does not begin as the result of a direct declassification request for that information. There have been two recent examples of NRO information and documents being released as the result of systematic declassification, CORONA and GRAB. The release of these documents was the result of this process of declassification known as a Systematic Declassification Review.

In response to Presidential Executive Order 12958, the NRO, in 1996, began reviewing previously classified information using several of the order's provisions. In November 1997, the NRO used these provisions to declassify and release the records associated with the three early photoreconnaissance satellite programs—CORONA, ARGON, and LANYARD. These three satellite programs operated from August 1960 through May 1972 producing more than 800,000 images. Resulting from 145 successful launches, the photographs from these systems allowed the United States and its allies to keep track of military targets and operations in denied areas and therefore to better understand Sino-Soviet strategic capabilities. The NRO Records describe the programmatic details of these systems.

The released collection of NRO records includes about 38,000 pages of document and program-related pictures, plus an historical videotape, that depict the development, construction, launch and operation of these reconnaissance satellites. Interested individuals may view this collection of declassified NRO records in the NRO Reading Room outside the headquarters building in Chantilly, VA.¹ Appointments are necessary 24 hours in advance and can be made by calling the Information Access and Release Center at (703) 808-5576.²



The NRO Reading Room, NRO Headquarters, Chantilly, VA

Information about the early electronic intelligence (ELINT) reconnaissance system, the Galactic Radiation and Background (GRAB) satellite system, also was declassified as a result of a Systematic Declassification Review. This U.S. Navy ELINT satellite system became operational in July 1960 and continued to provide valuable data until August 1962. The mission was to obtain information on Soviet air defense radars, information that could not be collected by Air Force and Navy ferret aircraft flying ELINT missions along accessible borders in Europe and the western Pacific. Because GRAB was in operation before the NRO formally existed as an organization, declassified information is available by contacting: NRL Code 8000, Naval Research Laboratory, 4555 Overlook Avenue, S.W., Washington, D.C. 20375-5320, by phone at (202) 767-6547, or on the Internet at www.nrl.navy.mil.

Mandatory Declassification Request

The second way in which NRO classified records become declassified is as a result of a Mandatory Declassification Request (MDR) filed under EO 12958. The MDR process permits individuals or agencies to challenge the classification of a particular document or group of documents and requires the NRO to review specified national security information for purposes of seeking its declassification. Requests must be in writing and describe the information with sufficient detail to permit the NRO to retrieve it with a reasonable

amount of effort. A mandatory review may result in the classification remaining the same, being reduced or being

¹Information about NRO records can be found on the Internet at http://www.nro.gov/foia/NRO_Released.htm

²The imagery from these satellites may be obtained through the National Archives and Records Administration, College Park, MD or from the U.S. Geological Survey's EROS Data Center Customer Service in Sioux Falls, SD.

removed all together. If you have questions about submitting a Mandatory Declassification Request to the NRO, please call the Information Access and Release Center at (703) 808-5576.

Freedom of Information Act Request

A Freedom of Information Act (FOIA) request is the third and final way that NRO records and information can be declassified. A FOIA request, in which classified records are found to be responsive, may result in the records being released in their entirety or released in part (i.e., with redactions). The Freedom of Information Act (FOIA) generally provides that any person has a right, enforceable in court, of access to federal agency records, except to the extent that such records (or portions thereof) are protected from disclosure by one of nine exemptions.

The goal of the NRO's FOIA office is to release as much information as possible, consistent with the need to protect information under the exemption provisions of the law. Where discretionary releases can be made without causing harm, the Chief Information Access and Release Center, as the initial denial authority, and the NRO Chief of Staff, as the appeal authority, use their discretion to release information even where an exemption may be available. Because of the sensitivity of NRO's functions and activities, the most often cited exemptions are national security information, (b)(1), and exemption by statute, (b)(3). If you have questions about submitting a FOIA request to the NRO, please call the Information Access and Release Center at (703) 808-5576.

The most recent example of information declassified as

a result of a FOIA request, is the release of records pertaining to the ITEK Corporation. There were 5,135 pages of declassified documents, consisting of correspondence between the NRO and the ITEK Corporation during the period 1959 to 1966, that were added to the NRO reading Room in 2000.³

Continuing Declassification Efforts & Access to Declassified Information

In the Interest of openness, the NRO continually evaluates retired programs for their potential for declassification. Currently, the NRO is assessing which of some classified programs might be potentially identified for systematic declassification as defined in EO 12958. These programs are undergoing a careful and thorough review involving a coordination process wherein each office and external agency that has an equity in the program has an opportunity to provide an assessment on areas where security classification is still required to protect sensitive intelligence sources and methods. If declassified, the documents will be brought together, reviewed, and declassified or exempted from declassification. When any NRO material is ready for review by the public, the NRO will announce its availability on the NRO Web Site and through public announcement. We will also include any declassification news in future issues of this *Bulletin*.

Conclusion

Despite the continued need for secrecy about many of the NRO's programs and activities, a large amount of information about the agency and its systems is available to the public, and more documents are being reviewed every day. The CORONA and GRAB programs have been declassified, and other retired programs are being examined to determine what can and cannot be released. Other information about the NRO and how it works also has been made public for example the NRO's correspondence with the ITEK Corporation in the 1960s. Consistent with the law and with the goal to release as much information as is appropriate, the NRO's declassification activities are consistently progressing, and we will continue to provide the public with as much information as possible.

However, as the Director of Central Intelligence, George Tenet, recently told an audience in Los Angeles, "The pace of technological change threatens to erode America's technical advantage in intelligence—an advantage

that has long been a pillar of our national security." Without the care and thoroughness in reviewing potential adverse consequences associated with declassification, our nation's advantage in national reconnaissance will decline. Therefore, we will continue to examine the risks in releasing information about NRO systems and activities, ensuring that the NRO can accomplish its mission of ensuring global information superiority.



The GRAB Satellite

Randy Cohen serves as the chief of the Information Management Group (IMG) within the NRO's Management Services & Operations Directorate. IMG is responsible for the NRO records management and declassification review programs, ensuring public access to NRO records and operating the NRO records center.

³Information about these documents can also be found on the Internet at http://www.nro.gov/foia/NRO_Released.htm

CONGRESSIONAL COMMISSION RELEASES POSITIVE NRO REPORT

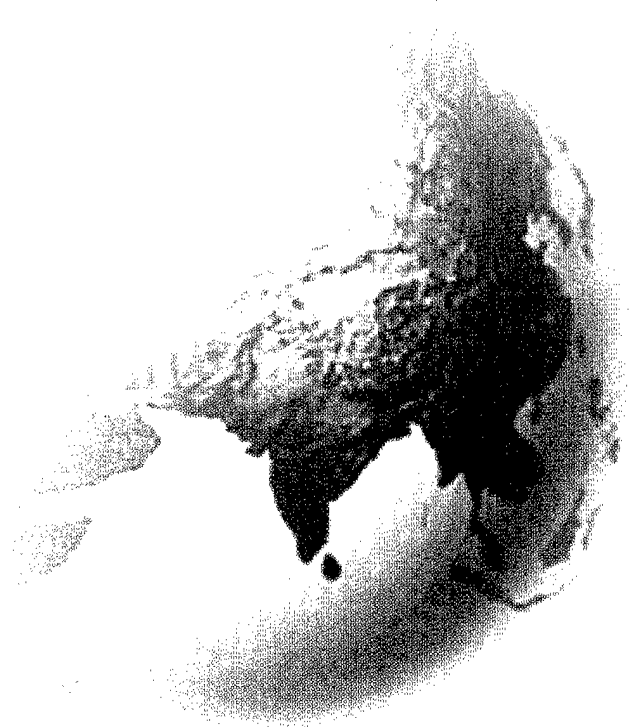
By Catherine Williams

The National Commission for the Review of the National Reconnaissance Office, established as part of the FY00 Intelligence Authorization Act, kicked off its 9-month investigation in March 2000. It was established to assess every aspect of the NRO's current organization, practices and authorities in order to "assure continuing success in satellite reconnaissance in the new millennium." The Commissioners focused extensively on the NRO's mission, technical skills, use of commercial imagery, acquisition processes, and relationships with contractors and other government entities. The Commission was co-chaired by Congressman Porter Goss (R-Florida) and Congressman Norm Dicks (D-Washington). Other members included Senator Bob Kerry (D-Nebraska), Senator Wayne Allard (R-Colorado), Tony Beilenson (former Congressman and Chairman of HPSCI), Larry Cox (President of SYGENEX Corporation), Marty Faga (MITRE Corporation CEO and former DNRO), LGEN Patrick Marshall Hughes (former Director DIA), Eli Jacobs (former member of NRP Task Force), William Schneider (former Under Secretary of State for Security Assistance, Science and Technology), and Joan Dempsey (DDCI/Community Management). DNRO Keith Hall was an *ex officio* member.

The Commission released its final report at the National Press Club on 14 November 2000. Essentially, it concluded that the NRO must remain a strong, separate activity, with a focus on innovation, within the Intelligence Community and the Department of Defense. Failure to understand and support the indispensable nature of the NRO as the source of innovative new space-based intelligence collection systems will result in significant intelligence failures. These failures will have a direct influence on strategic choices facing the nation and will strongly affect the ability of U.S. military commanders to win decisively on the battlefield.

In addition to the overall conclusion, there are 25 specific recommendations that primarily focus on the NRO mission, SECDEF/DCI relationship, a balanced response to NRO customer demands, and budgetary flexibility. Of particular interest to NRO constituents is the recommendation for the SECDEF and the DCI to establish a new Office of Space Reconnaissance under the direction of the DNRO. The office would have special acquisition authorities, be staffed by experienced military and CIA personnel, have a budget separate from other agencies and activities within the National Foreign Intelligence Program, be protected by a special security compartment, and operate under the personal direction of the President, SECDEF, and DCI.

In compliance with the legislation, the SECDEF and DCI have 60 days to respond to the Commission recommendations. The NRO Office of Policy was actively involved in drafting/reviewing these responses, and CSNR may publish them in future bulletins. With the change in administration, it is not known how many (if any) of the Commission recommendations will be implemented. If you are interested in reading the full report, it is available on the Commission's internet website: www.nrocommission.com.



LICENSE GRANTED FOR HALF-METER RESOLUTION COMMERCIAL SATELLITE IMAGING SYSTEM

By Tom Nath and Jim Kane

The National Oceanic and Atmospheric Administration (NOAA), the office in charge of granting licenses for commercial remote sensing satellite imaging systems, issued on 6 December 2000 "second generation" licenses to two U.S. companies for systems capable of collecting images at resolutions of 0.5-meter panchromatic (black and white) and 2.0-meter multispectral. First generation systems are licensed at 0.82-meter panchromatic and 3.28-meter multispectral. The NOAA granted the licenses after the Intelligence Community, White House, Department of Defense, Department of the Interior, and State Department reviewed the request during the past year. The NRO Office of Policy played a major role in the interagency review process via its responsibilities within the Remote Sensing Committee, the Intelligence Community forum that oversees all remote sensing policy issues. The NRO personnel helped determine the careful balance between enhancing U.S. industry and protecting critical national security and foreign policy interests. The decision will allow commercial industry to reduce the burden on the NRO's tasking requirements by selling its products to the U.S. Government. It will also allow the NRO to concentrate on high-end requirements, and focus on the cutting edge technology in accordance with the recommendations of the NRO Commission and the NRO Charter. Concerns that sensitive U.S. or allied information would be revealed by these images were alleviated by the mandatory 24-hour delay in providing customers with the images, and the option, in a crisis, for the U.S. Government to shut down commercial satellites to protect national security and foreign policy interests.

***** IN MEMORIAM



REID D. MAYO

Mr. Reid D. Mayo, 75, a National Reconnaissance Pioneer, died in a car accident on 9 February 2001 in Calvert County, Maryland. Mr. Mayo, a retired engineer and manager at the Naval Research Laboratory, was honored for his achievements at the Pioneer Recognition Ceremony at the National Reconnaissance Office Headquarters in September 2000. He conceived and engineered the first Navy signals intelligence satellite system in 1958-1960, and worked on various NRO programs in the next two decades.

Through 1981, Mr. Mayo served as a project engineer and technical director of the NRO's Program C, which embraced the U.S. Navy satellite reconnaissance element in the National Reconnaissance Program. He led the design and acquisition of more powerful electronic intelligence satellite systems, including the ground readout and analysis equipment required to support them. He made invaluable contributions to national security by helping to establish the foundation for the nation's signals and electronic intelligence satellite programs.

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EXPLANATION OF GRAPHICS

Inside Front Cover: This quotation from President Dwight D. Eisenhower appears on the NRO's 40th Anniversary Commemorative Plaque that is located in the NRO Headquarters Building in Chantilly, Virginia. The quotation is a composite of remarks from a 1960 radio and television report to the American people and comments from a 1959 meeting with the Board of Consultants on Foreign Intelligence Activities.

Collage of CORONA Recovery Vehicle, U-2 Aircraft, and GRAB Satellite

Page 8: CORONA satellite launch on the Thor Agena B/D, October 26, 1960

Page 13: Main Entrance to the National Reconnaissance Office Headquarters Building in Chantilly, VA

Page 17: Artist's rendition of the earth

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